Section 3.1

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"Learning is not child's play; we cannot learn without pain."

- Aristotle

Where's the p-value?

Let π denote some population proportion of interest and suppose a 99% confidence interval for π is calculated to be (0.5, 0.8). Also, suppose that we want to test $H_0 : \pi = 0.79$ vs. $H_a : \pi \neq 0.79$.

(1) What can you say for sure about the corresponding p-value?

A The corresponding p-value will be greater than 5%.

B The corresponding p-value will be equal to 1%.

C The corresponding p-value will greater than 1%.

D The corresponding p-value will less than 1%.

Suppose we are constructing a confidence interval using repeated tests of significance. Using two-sided tests each time with the following null hypotheses, we obtain these p-values.

Null	p-value	Null	p-value
Proportion = 0.45	0.014	Proportion = 0.53	0.787
Proportion = 0.46	0.032	Proportion = 0.54	0.572
Proportion = 0.47	0.062	Proportion = 0.55	0.373
Proportion = 0.48	0.126	Proportion = 0.56	0.142
Proportion = 0.49	0.371	Proportion = 0.57	0.077
Proportion = 0.50	0.598	Proportion = 0.58	0.042
Proportion = 0.51	0.733	Proportion = 0.59	0.021
Proportion = 0.52	0.986	Proportion = 0.60	0.003

(2) Give an approximate 90% CI in the form $(lower, upper)$.

A $(0.47, 0.58)$

B $(0.47, 0.57)$

C $(0.48, 0.56)$

D $(0.46, 0.57)$

Let π denote some population proportion of interest and suppose a 95% confidence interval for π is calculated to be (0.25, 0.55).

(3) Give one plausible value for π.

A 0.20

B 0.56

C 0.13

D 0.95

E None of the above.

Let π denote some population proportion of interest and suppose a 95% confidence interval for π is calculated to be (0.25, 0.55).
(4) Make a guess for what the two-sided p-value would be if you hypothesized that $\pi = 0.58$.

A 0.99

B 0.01

C 0.25

D 0.50

E None of the above.

A representative sample to estimate some population proportion π produces the sample proportion $\hat{p} = 0.54$. A test of $H_0 : \pi = 0.51$ against the alternative $\pi \neq 0.51$ gives a p–value of $p = 0.16$.

(5) What can you say about the p–value one would obtain for the null hypothesis $H_0 : \pi = 0.52$?

A It would be smaller than $p = 0.16$ because $\hat{p} = 0.54$ is closer to $\pi_0 = 0.52$ than it is to $\pi_0 = 0.51$.

B It would be larger than $p = 0.16$ because $\hat{p} = 0.54$ is closer to $\pi_0 = 0.52$ than it is to $\pi_0 = 0.51$.

C It would be the same because $\hat{p}$ has remained the same.

D You would have to run the test or a simulation to decide.

A representative sample to estimate some population proportion π produces the sample proportion $\hat{p} = 0.54$. A test of $H_0 : \pi = 0.51$ against the alternative $\pi \neq 0.51$ gives a p–value of $p = 0.16$.

(6) What can you say about the p–value one would obtain for the null hypothesis $H_0 : \pi = 0.57$?

A It would be smaller than $p = 0.16$ because $\hat{p} = 0.54$ is less than $\pi_0 = 0.57$.

B It would be larger than $p = 0.16$ because the z–score for 0.57 is positive.

C It would be similar to $p = 0.16$ because 0.57 is the same distance from 0.54 as 0.51 is.

D You would have to run the test or a simulation to decide.

A representative sample to estimate some population proportion π produces the sample proportion $\hat{p} = 0.54$. A test of $H_0 : \pi = 0.51$ against the alternative $\pi \neq 0.51$ gives a p–value of $p = 0.16$.

(7) Assuming a two–tailed alternative, which of the following null hypotheses do you think will give a p–value smaller than $p = 0.16$?

A $H_0 : \pi = 0.64$.

B $H_0 : \pi = 0.53$

C $H_0 : \pi = 0.47$.

D B and C but not A.

E A and C but not B.

Teenage hearing loss has increased significantly in America over the past several years. A 95% CI using the interval of plausible values method is given by $(0.16, 0.23)$.

(8) Which of the following could be the 99% CI based on the same sample?

A $(0.13, 0.22)$

B $(0.18, 0.21)$

C $(0.14, 0.25)$

D $(0.16, 0.27)$

E None of the above.

Key Terms and Ideas to Understand in Section 3.2 and 3.3

- Confidence level
- Margin-of-error
- Center of CI
- Multiplier
- Standard error of $\hat{p}$
- Standard error of $\overline{x}$
- 2 SD Method for CIs